IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|---|---|
| In re Patent Application of:<br>Richard D. Thornton et al<br>Application No.: 10/676.726<br>Filed: October 1, 2003<br>For: SUSPENDING, GUIDING AND PROPELLING VEHICLES USING MAGNETIC FORCES | Confirmation No.: 2495<br>Art Unit: 2834<br>Examiner: Burton S. Mullins<br>Telefax No.: 703-872-9306 |

I hereby certify that this correspondence is being transmitted by facsimile to the telephone indicated below, or deposited with the U.S. Postal Service with sufficient postage as First Class Mail, in an envelope addressed to: MS AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below.

Dated: 6-3-05 Signature: _____
(David J. Powsner)

DECLARATION OF RICHARD D. THORNTON

I, Richard D. Thornton, a resident of Concord, Massachusetts, declare and state as follows:

1. I am a co-inventor of the invention claimed in the above-referenced patent application ("the Application").

2. I am a Professor Emeritus of the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. I was elected a Fellow of the IEEE (Institute of Electrical and Electronics Engineers) on the basis of my expertise and contributions in the field of magnetic levitation ("maglev") transportation systems.

3. The claims currently pending in the Application are reprinted in Exhibit I hereto.

4. I understand that claims 1 – 3, 5 – 8, 10 – 16 have been rejected over United States Patent No. 5,370,059 ("the '059 patent"), which issued in December 1994, in the name of assignee Thyssen Industrie AG ("Thyssen").

5. I understand that rejection is premised on the contention that the '059 patent teaches *inter alia* a vehicle having an array of magnets which effects all of the following (i) magnetic

attraction forces to at least one rail of a guideway that has windings for a linear synchronous motor, (ii) lateral restoring forces sufficient to provide guidance for the vehicle without the need for additional structure to provide such guidance, and (iii) longitudinal forces in response to electrical current in one or more of the windings.

6. I disagree. The '059 patent is concerned with guideway support structures. It says little about the vehicles used on those structures, much less, among other things, about the lateral restoring forces used for guidance of those vehicles.

7. In the latter regard, I understand that the Examiner has identified the text at column 1, lines 51 – 56, of the '059 patent, as suggesting that the illustrated system provides lateral restoring forces without the need for additional structure. However, my reading of that text (reprinted below) indicates that it has nothing to do with such forces:

> ment parts are to be exactly positioned and firmly secured to the track structure, and the mounting costs, up to the final adjustment of the parts in positions variable by screwing, are high. The working components and equipment parts can be structurally united only in few individual instances, since frequently materials are needed for the equipment parts having coefficients of

8. The text at column 4, lines 13 - 14, of the '059 patent, is reprinted below. I do not understand that text to suggest that even two magnets would be sufficient to provide lateral restoring force as required in the pending claims of the Application:

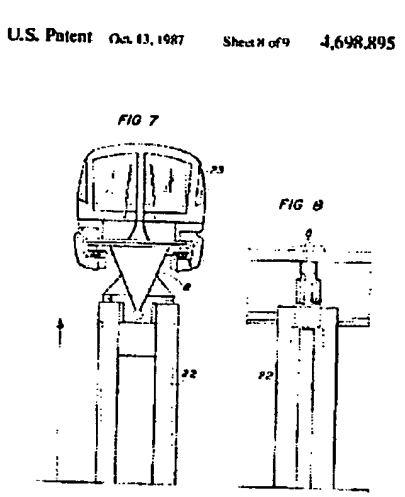
> magnets simultaneously provide the excitation field of the long-stator of the motor. Generally, the equipment elements 2 are provided on both sides of the supports 1 of the supporting structure, an the support magnets 4 are arranged on both sides of the vehicle 5.
> The bottoms of all eqipment elements 2 have opera-

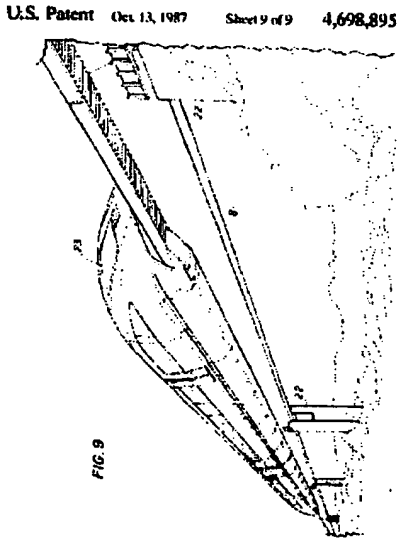
9. More generally, I am unable to discern any teaching of the ' 059 patent suggesting *inter alia* a vehicle having an array of magnets which effects all of the following (i) magnetic attraction forces to at least one rail of a guideway that has windings for a linear synchronous motor, (ii) lateral restoring forces sufficient to provide guidance for the vehicle without the need for

additional structure to provide such guidance, and (iii) longitudinal forces in response to electrical current in one or more of the windings.

10. Thyssen, the assignee of the '059 patent, is one of the principal developers of the well-known Transrapid magnetic levitation transportation system. Not only am I familiar with the structure and operation of that system, I have discussed it with the engineers responsible for design of its propulsion and suspension subsystems. And, I have ridden on a prototype of the Transrapid.

11. Indeed, a familiar depiction of Transrapid is provided in Figures 7 and 9 of U.S. Patent 4,698,895 ("the '895 patent"), reprinted below. The '895 patent is referred to throughout the specification of the '059 patent in a manner suggesting that the later ('059) was intended to describe improvements on the guideway support structures of the former ('895).




12. Like the '059 patent — and contrary to the invention recited in the pending claims of the Application — Transrapid does not use *inter alia* an array of magnets to effect all of the following (i) magnetic attraction forces to at least one rail of a guideway that has windings for a linear synchronous motor, (ii) lateral restoring forces sufficient to provide guidance for

the vehicle without the need for additional structure to provide such guidance, and (iii) longitudinal forces in response to electrical current in one or more of the windings.

13. Instead, Transrapid uses entirely separate structures to achieve magnetic attraction and longitudinal forces, on the one hand, and lateral restoring forces, on the other hand. Those separate structures are suggested in the details of Figure 7 of the '895 patent (see ¶ 11, above) and are clearly shown in the depictions below:

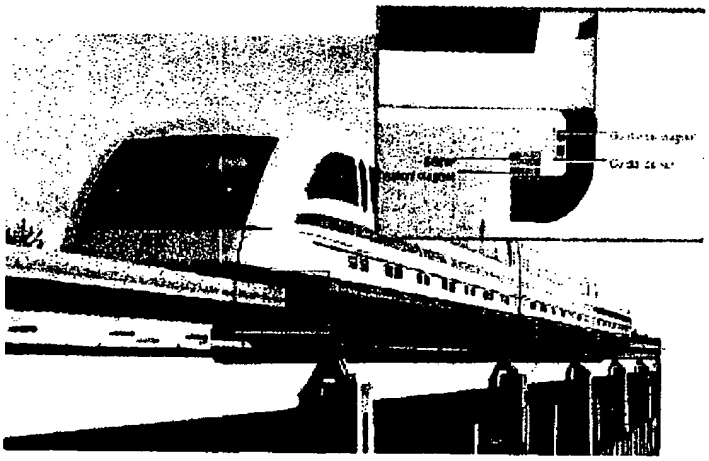


**Figure A-2: Transrapid TR08 High Speed Vehicle**

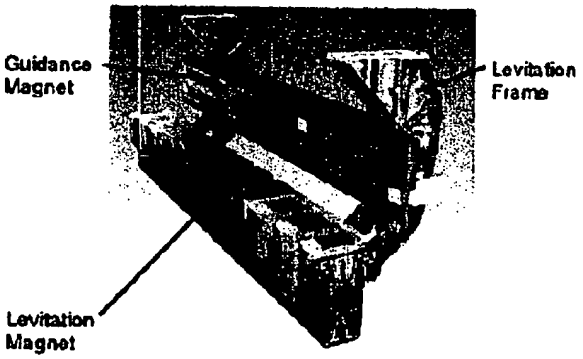
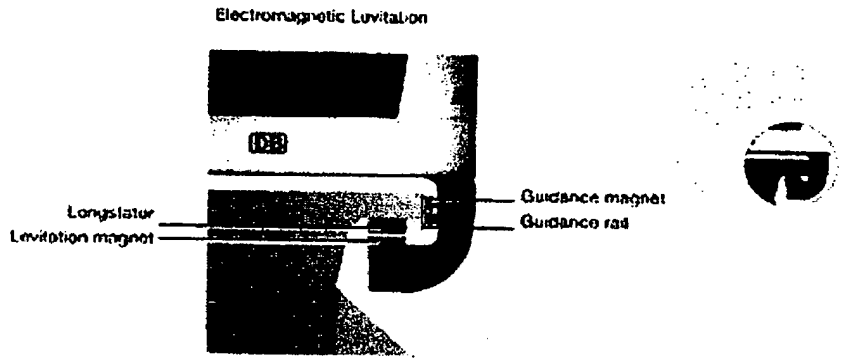



Fig 15 The levitating and lateral




14. The first of the three depictions is from Urban Maglev Technology Development Program – Colorado Maglev Project – Executive Summary of Final Report, Colorado Department of Transportation, June 2004, at page 3. The second and third depictions above are from Construction of a Magnetic Levitating Train with the high temperature superconductor Y-Ba-Cu-O, Carl Sunde, Chalmers University of Technology, at page 26. The date of this latter publication is unknown, though it was downloaded from the Internet on May 31, 2005 (from http://www.nephy.chalmers.se/staff-pages/kalle/publications/exjobb.pdf).

15. Based on my experience and expertise, the depictions in ¶ 13 fairly and reasonably represent the separate structures used by Transrapid achieve magnetic attraction and longitudinal forces, on the one hand, and lateral restoring forces, on the other hand. Contrary to the claims of the Application, no single magnet array of Transrapid is capable of effecting all of those functions.

16. In sum, from my knowledge and as evidenced in the foregoing, neither the '059 patent nor the Transrapid system on which it is based use the same array of magnets to effect all of the following (i) magnetic attraction forces to at least one rail of a guideway that has windings for a linear synchronous motor, (ii) lateral restoring forces sufficient to provide guidance for

the vehicle without the need for additional structure to provide such guidance, and (iii) longitudinal forces in response to electrical current in one or more of the windings.

17. I hereby declare that all statements made herein off my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

June 1, 2005
Date

Richard D. Thornton